

**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
DAM SAFETY PROGRAM
Honolulu, Hawaii**

April 9, 2021

**Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii**

STAFF REPORT

Regarding: Dam Safety Enforcement Action on Wahiawa Dam (OA-0017) for Failure to Comply with Notice of Deficiency, Issued February 18, 2020

Dam Owners: Dole Food Company Hawaii
Mr. Daniel X. Nellis, General Manager
1116 Whitmore Avenue
Wahiawa, HI 96786

Sustainable Hawaii, Inc.
Mr. Howard Green, Manager
P.O. Box 3467
Honolulu, HI 96801

Location: Wahiawa, Hawaii

Tax Map Key: 7-1-012:014, 7-3-007:001, 7-3-013:003, 7-3-012:002

Background on Dam

Wahiawa Dam was constructed in 1906 as a source of irrigation water for the Waialua Sugar Company. The dam is owned by Sustainable Hawaii, Inc. and Dole Food Company Hawaii ("Owners"). Wahiawa Dam is classified as a High hazard potential dam, as a failure of the dam will result in probable loss of human life. In 1921, a 5,000 cfs (cubic feet/second) flood caused the failure of the dam, which was rebuilt with the existing 183-foot-wide spillway. A dam failure of the current dam would flood a significant portion of Waialua and Haleiwa towns.

The reservoir receives inflow from the north and south forks of Kaukonahua Stream that originate in the Koolau Mountains. The upstream contributing drainage basin is approximately 16.9 square miles in surface area with its highest point in the Koolau Range at an elevation of about 2,600 feet (MSL). Two US Army dams are located in this upper watershed, the Ku Tree and Koolau Reservoirs. The major portion of the

drainage is contained in the lower, more gently dipping slopes between the foot of the mountains and the area adjacent to the dam site. There are no diversions from other watersheds into this reservoir.

The reservoir is utilized by the community as a freshwater recreation area and also receives effluent discharge from a City owned wastewater treatment facility. Discharge from the dam flows through a 6.5 ft diameter concrete lined tunnel which discharges to Kaukonahua Stream. The original outlet works were abandoned in 1930 due to leakage.

Dam Features:

Embankment:	Earthen Embankment with rock lined face.
Length:	Embankment approximately 660 feet
Height:	100 feet
Max Impoundment:	7,761 acre-feet (2,590 million gallons)
Spillway:	183-foot-wide concrete lined trapezoidal channel

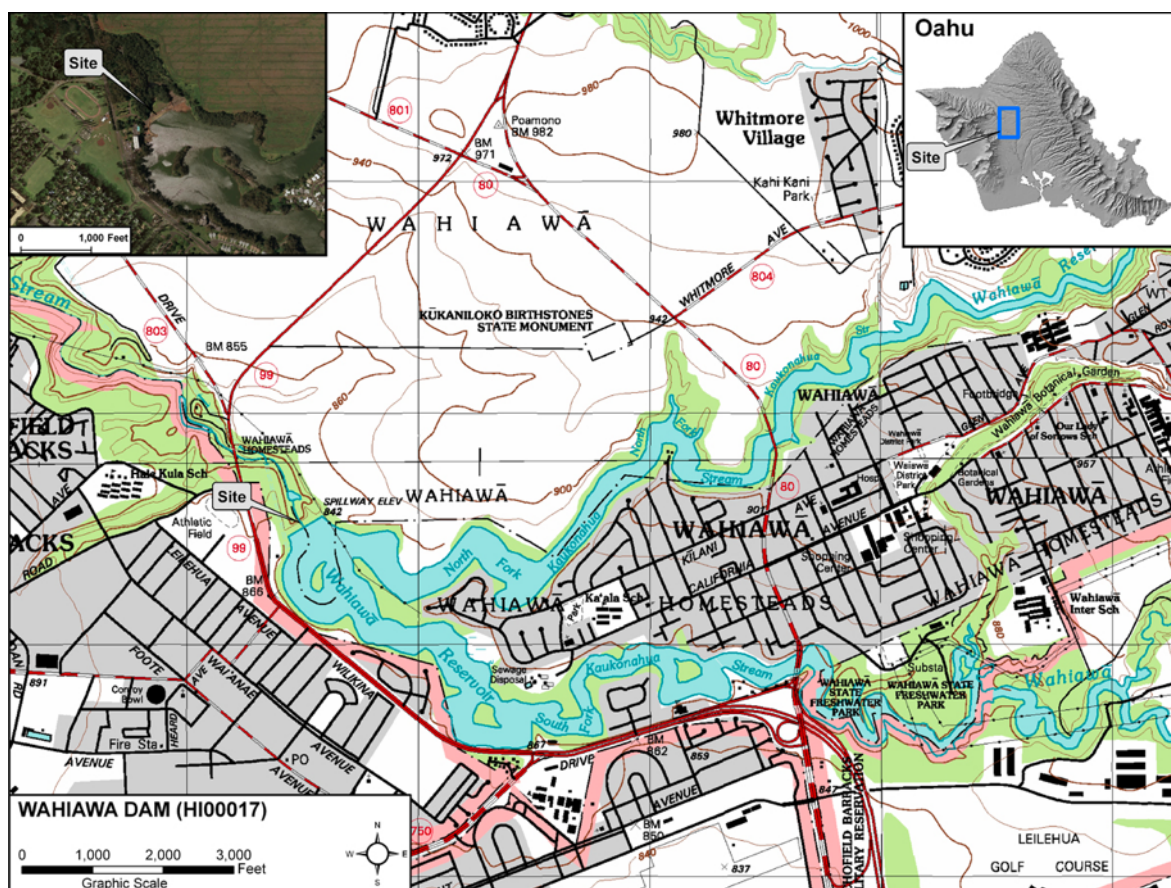


Figure 1. Location map.

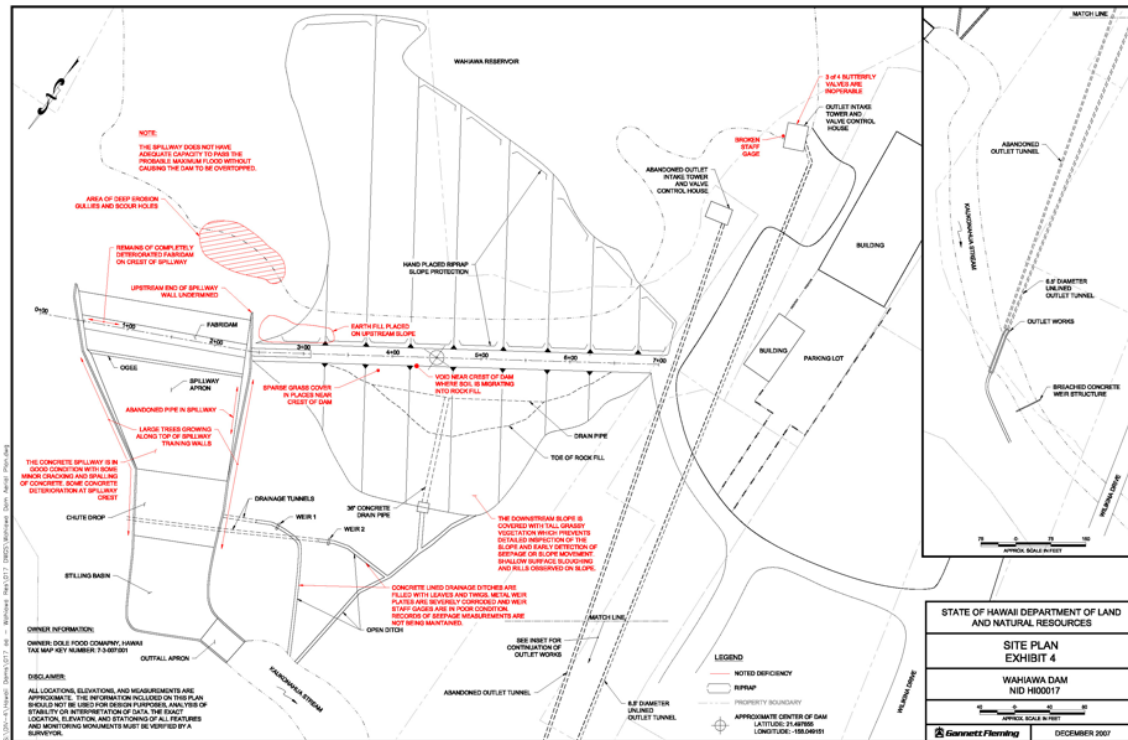


Figure 2. Dam schematic.



Figure 3. Aerial view.

Primary Safety Issues

The Wahiawa Dam is classified as having a Poor Overall Condition classification due to various deficiencies, including having an undersized spillway. The dam is anticipated to be overtop during storm events approaching the Probably Maximum Flood (PMF). The aging concrete spillway structure integrity is uncertain and may potentially be compromised during a significant flow event. In 2018, ahead of the approaching Hurricane Lane, DLNR procured an “Aqua Dam” to help increase embankment / spillway capacity if the hurricane stalled over the islands.

Uncertainties on the condition of the former outlet works and existing seepage drains in the embankment have the potential to develop into a failure if not monitored. Other potential deficiencies have been identified in the 2020 Phase I investigations by DLNR consultant, Yogi Kwong Engineers, LLC.

On October 26, 2016, DLNR restricted the reservoir operation level to be 15 feet below the spillway, or 65 feet as measured on the reservoir staff gage.



Figure 4. Spillway looking downstream.



Figure 5. Crack in right spillway wall.

Enforcement Actions and Owner Responses

The DLNR has issued four Notice of Deficiency (NOD) letters to the Owner dating back to 2009. See Attachment A for the NOD letters. The following is a summary for each NOD:

1. On June 4, 2009, DLNR issued an NOD to Dole Food Company Hawaii with multiple action items including but not limited to the following: (1) Developing a work plan and schedule to address the inadequate spillway capacity, (2) evaluate and address the stability of the embankment, (3) provide a work plan and schedule to repair or replace the outlet structure gates, (4) removal of unwanted vegetation, (5) submittal of the safe/rated carrying capacity of the outlet tunnel, (6) and address the deficiencies in the Gannett Fleming Phase 1 Dam Safety Inspection Report (August 2008).
2. On March 5, 2014, DLNR issued an NOD to the Owner to request a completed Emergency Action Plan (EAP) by May 1, 2014.
3. On October 26, 2016, DLNR issued an NOD to the Owner requiring immediate action including but not limited to the following: (1) Submittal of a Remediation Schedule detailing when deficient conditions will be corrected, (2) lowering the operating water level to 65-feet, and (3) submittal of monthly monitoring reports.
4. On February 18, 2020, the DLNR issued an NOD to the Owner requiring action on the following items: (1) Submittal of technical studies by 3/1/2020, (2) submittal of a Dam Safety permit application by 3/1/2021, (3) begin construction by 3/1/2022, and (4) submittal of monthly monitoring reports.

The Owner submitted response letters in 2009, 2019, and 2020 (see Appendix B). On December 17, 2020, DLNR staff met with the Owner to discuss the current status of the dam (see Appendix C for the meeting notes). On December 30, 2020, the Owner requested a 12-month extension on the action item deadlines in the February 2020 NOD. Specifically, the extension would allow the Owner to submit a Dam Safety permit application on 3/1/2022. Table 1 below provides a summary of NOD action items, deadlines, and current status.

No.	NOD Date	Deadline	Item	Current Status
1	6/4/2009	6/30/2009	Initiate lowering of the water level to 60-feet on gage to allow the investigation of the condition of the highest gate in the outlet structure.	Completed.
2	6/4/2009		Maintain a normal daily water level of 65-feet on gage after the completion of the upper gate investigation.	Completed.
3	6/4/2009		Initiate monitoring of the water level and dam condition and report WEEKLY in	Completed.

			writing or via email to involved parties until after the completion of the upper gate investigation, and a daily water level of 65-feet on gage level is maintained.	
4	6/4/2009		Prior to lowering the water level to investigate the gate, contact Francis Oishi, DLNR-DAR, to arrange monitoring of the aquatic resources and Curt Cottrell, DLNR-Parks, to arrange for possible closure of the boat ramp in the freshwater park	Completed.
5	6/4/2009	7/31/2009	Written status of the following:	A status update was provided on 7/16/09.
			Evaluating and providing a work plan and schedule for addressing the inadequate spillway capacity.	Spillway capacity is still undersized. In Nov 2017, RM Towill completed an H&H study and design concepts to pass PMF. In Nov 2018, developed emergency contingency plan using Aqua Dam.
			Providing a conceptual work plan and schedule for repairing or replacing the gates within the outlet structure.	Per 2016 Dole report, Owner replaced three inoperable gate valves.
			Evaluating and addressing the stability of the embankment.	Per Owner's letter from 4/30/19, in May 2018, Hirata & Assoc completed a slope stability analysis, confirming embankment is in satisfactory condition.
			Removal of unwanted vegetation.	On-going.
			Submittal of the Final Outlet Tunnel Repair Report and the new safe/ rated carrying capacity of the tunnel.	Per 2016 Dole report, the tunnel work was done, but report for carrying capacity of tunnel is still pending.
			Addressing all other deficiencies noted in the Gannett Fleming Phase I Dam Safety Inspection Report (August 2008).	On-going.

6	3/5/2014	5/1/2014	Submit to DLNR a completed EAP for the subject dam.	Completed.
7	10/26/2016	11/5/2016	Maintain a lower water level in the reservoir at 15 feet below spillway (65 FT. ON GAGE) within ten (10) days of this notice.	Completed.
8	10/26/2016	11/15/2016	Submit a Remediation Schedule to the Department detailing when deficient conditions will be corrected.	Not completed.
9	10/26/2016		Continue operation of a real time water level monitoring gage system to monitor the water level in the reservoir and provide DLNR access to real time data readings.	Completed.
10	10/26/2016	11/26/2016	Update the Emergency Action Plan. If your EAP has not been updated in the last 12 months, update and distribute updated copies.	Completed.
11	2/18/2020	3/1/2020	Submit Technical Studies to support the proposed improvements.	Completed.
12	2/18/2020	3/1/2021	Submit Dam Safety Permit Application.	Owner requesting 12-mo extension.
13	2/18/2020	3/1/2022	Start Construction.	Owner requesting 12-mo extension.
14	2/18/2020	Monthly	Submit monthly monitoring reports including reservoir water level, photos of the water level at the staff gage and other pertinent information to the Department.	Completed.

Table 1. Summary and status of NOD action items.

A list of previous studies and reports on the Wahiawa Dam, consultant recommendations from the 2020 Yogi Kwang Engineers Phase 1 Investigation, and a discussion on the Owner's response and plans for the dam is included in Appendix D.

Staff Recommendations

The Owner has been informed of the reservoir's deficiencies and the regulatory requirements in multiple reports and notices dating back to 2009. To date, the safety deficiencies with the spillway have not been addressed. Accordingly, DLNR staff is recommending enforcement action by issuing fines and actions as discussed below.

1. Pursuant to Hawaii Revised Statutes (HRS) §179D and Hawaii Administrative Rules (HAR) §13-190.1, the DLNR staff recommends the Board find that the owners of the Wahiawa Dam (OA-0017), the DOLE FOOD COMPANY HAWAII and SUSTAINABLE HAWAII, INC., are in violation of HAR §13-190.1-4(c) for its dam spillway not having the capacity to safely pass the PMF inflow design flood. As a result of this violation, the owners will be subject to the following:
 - a. The DOLE FOOD COMPANY HAWAII and SUSTAINABLE HAWAII, INC. is fined \$20,000 for failing to submit a Dam Safety Permit application to address the safety deficiencies with the spillway by the DLNR deadline of 3/1/2021, pursuant to HAR §13-190.1-4(c).
 - b. The DOLE FOOD COMPANY HAWAII and SUSTAINABLE HAWAII, INC. shall pay all fines (total \$20,000) within sixty (60) days of the date of the Board's action.
 - c. In the event the DOLE FOOD COMPANY HAWAII and SUSTAINABLE HAWAII, INC. fails to comply with any order herein, the Owner shall be fined an additional \$5,000 per day until the order is complied with.
2. Pursuant to HRS §179D-6(b)(17), the DOLE FOOD COMPANY HAWAII and SUSTAINABLE HAWAII, INC. shall be required to comply with the following actions as indicated below:
 - a. Within ninety (90) calendar days of the date of the Board's action: Submit a detailed explanation (i.e., justification) reconciling the difference between the 2017 R.M. Towill model peak inflow PMF result and the 2008 US Army Corps of Engineers (ACOE) peak inflow PMF result. If necessary, submit an updated H&H study, confirming the peak flows during both frequency floods and a PMF event.
 - b. Within one hundred eighty (180) calendar days of the date of the Board's action submit a plan to address the spillway safety deficiencies with a conceptual design for the spillway remediation, as applicable.
 - c. Within twelve (12) months of the date of the Board's action submit a Dam Safety Permit Application package (HAR §13-190.1-20) to bring the Wahiawa Dam into compliance with HAR §13-190.1-4.

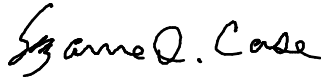
A summary sheet of the Wahiawa Dam and a scorecard, which includes a breakdown of the recommended penalties, are shown in Attachment E.

Respectfully submitted,



CARTY S. CHANG
Chief Engineer

APPROVED FOR SUBMITTAL:



SUZANNE D. CASE, Chairperson
Board of Land and Natural Resources

ATTACHMENTS:

- A Notice of Deficiency Letters from June 4, 2009, March 5, 2014, October 26, 2016, and February 18, 2020
- B Owner Response Correspondence from July 16, 2009, April 30, 2019, and December 30, 2020
- C Meeting Notes for Meeting on December 17, 2020 Between the Owner and DLNR Staff
- D List of Previous Studies & Reports, Consultant Recommendations, and Owner's Response and Plans
- E Summary Sheet of the Wahiawa Dam and Scorecard

ATTACHMENT A

Notice of Deficiency Letters from June 4, 2009, March 5, 2014,
October 26, 2016, and February 18, 2020

LINDA LINGLE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

ENGINEERING DIVISION
POST OFFICE BOX 373
HONOLULU, HAWAII 96809

JUN - 4 2009

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

7007 2560 0000 9256 6869

Mr. Dan Nellis, Director of Operations
Dole Food Company Hawaii
1116 Whitmore Avenue
Wahiawa, Hawaii 96886

Dear Mr. Nellis:

**NOTICE OF DAM SAFETY DEFICIENCY
WAHIAWA DAM [HI00017]
OAHU, HAWAII**

This letter follows up on our meeting of March 13, 2009 and the recommendations of the recently completed Phase I Dam Safety Inspection of the Wahiawa Dam. On October 30, 2007 a Phase I Dam Safety Inspection was conducted by Gannett Fleming, Inc. on behalf of the Department of Land and Natural Resources (DLNR), Engineering Division (ENG) for the Wahiawa Dam (HI00017). During the inspection, inspectors found several dam safety deficiencies. These deficiencies were transmitted to you on October 13, 2008 in the Final Phase I Investigation Report (August 2008) and the Priority 1 recommendations are summarized below.

- 1. Modify the Spillway and Dam to Safely Pass the PMF or Breach the Dam.**
The existing spillway capacity is less than 50 percent of the PMF. This is a serious dam safety deficiency. Failure to address this deficiency can result in overtopping and failure of the embankment.
- 2. Evaluate the Need to Provide Additional Drawdown Capacity.** Only one 20-inch gated intake is operational. It is our understanding the 20-inch gate was installed between two of the three existing inoperable 36-inch by 48-inch gated intakes. Evaluate the adequacy of the existing 20-inch gated intake to maintain the lowered pool and to provide reliable reservoir drawdown capacity in the event of an emergency.

3. **Perform Additional Embankment Stability Investigations.** Based on a review of the construction history and prior stability analyses performed on the dam, as noted concerns remain. The absence of an embankment filter zone between the hydraulic fill and rock fill can result in the migration of the hydraulic fill into the rock fill as the timber core wall deteriorates.
4. **Develop New Dam Instrumentation Plan and Program.** Current instrumentation at the dam includes several piezometers, a reservoir staff gage, and several seepage weirs. All of these instruments are in a deteriorated state and are not being maintained, monitored, or analyzed.
5. **Remove Unwanted Vegetation and Maintain Grass Cover.** The vegetation on the embankment and along the spillway walls must be controlled and maintained. Tall grass on the embankment and trees and woody vegetation on the groins and along the toe of the dam needs to be removed.

ACTION:

Based on the above listed deficiencies and our meeting on March 13, 2009 please take the following actions:

1. Initiate lowering of the water level to 60-feet on gage to allow the investigation of the condition of the highest gate in the outlet structure. Complete this investigation and report the findings by **June 30, 2009**. Please notify us immediately if delays are encountered due to inclement weather and/or other conditions.
We also recommend you take advantage of the lowered water level to hire divers to evaluate the other gates in the structure at the same time.
2. Maintain a normal daily water level of 65-feet on gage after the completion of the upper gate investigation.
3. Initiate monitoring of the water level and dam condition and report WEEKLY in writing or via email to involved parties (i.e. DLNR-ENG, DLNR-DAR, DLNR-Parks, DOH-CWB, Sustainable Hawaii, etc.) until after the completion of the upper gate investigation, and a daily water level of 65-feet on gage level is maintained.
4. Prior to lowering the water level to investigate the gate, please contact Francis Oishi, DLNR-DAR at 587-0094 to arrange monitoring of the aquatic resources and Curt Cottrell, DLNR-Parks at 587-0062 to arrange for possible closure of the boat ramp in the fresh water park

By **July 31, 2009**, submit written correspondence to our office on the status of:

5. Evaluating and providing a work plan and schedule for addressing the inadequate spillway capacity.
6. Providing a conceptual work plan and schedule for repairing or replacing the gates within the outlet structure.
7. Evaluating and addressing the stability of the embankment.
8. Removal of unwanted vegetation.
9. Submittal of the Final Outlet Tunnel Repair Report and the new safe/rated carrying capacity of the tunnel.
10. Addressing all other deficiencies noted in the Gannett Fleming Phase I Dam Safety Inspection Report (August 2008).

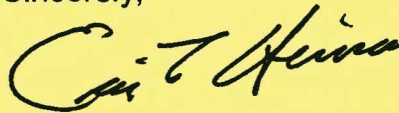
HRS, §179D-8, provides for penalties of up to \$25,000 per day for each violation. DLNR-ENG reserves its right to seek penalties for all violations, including those described above or failure to respond adequately to this notice.

Please submit all requested information and acknowledgment of the above set schedule, within the stipulated deadlines to:

Department of Land and Natural Resources
Engineering Division
1151 Punchbowl Street, Rm 221
Honolulu, Hawaii 96813
Telephone: 808-587-0230, Fax: 808-587-0283

Should you have any questions, please contact Denise Manuel or Edwin Matsuda of my staff at 587-0246 or 587-0268.

Sincerely,



ERIC T. HIRANO
Chief Engineer

Enclosure: Meeting minutes

c: Howard Green, Sustainable Hawaii
 DLNR, Division of Aquatic Resources
 DLNR, Division of State Parks
 DOH, CWB

Meeting Minutes



Meeting Date: March 13, 2009

Location: Dept. of Health Conference Room

Attendees:

Alec Wong, DOH			<u>DLNR Eng. Division, Dam Safety Section</u>
			Eric Hirano, Chief Engineer
<u>Wahiawa Dam Owners:</u>			Edwin Matsuda
Dan Nellis, Dole Foods			Denise Manuel
Mark Takemoto, Dole Foods/Castle and Cooke			Jimmy Leung
Howard Green, Sustainable Hawaii			John Dawley
			Annette Tagawa, DLNR Div. of Aquatics Res.

These are minutes of the meeting held March 13, 2009 at the Health Department Conference Room relating to the Wahiawa Dam.

Purpose: The meeting was to discuss the impacts and constraints for possible interim operations to mitigate against failure of the dam due to overtopping from large storm events. The two primary deficiencies being addressed were the inadequate spillway capacity and slow and limited drawdown capabilities of the outlet works. DLNR Engineering Division staff noted that although we are looking into alternative interim operations to mitigate against the failure of the dam, these are not considered permanent or complete remedies. The owners of the dam would need to come up with long term permanent fix to increase the spillway capacity to accommodate the Probable Maximum Flood event (PMF). DLNR desires to obtain feedback comments from other parties on this lower water level operation proposal.

Discussion:

The Engineering Division of the Department of Land and Natural Resources is in the process of determining what a safe initial starting reservoir level would be. The present agreed upon level is 72.5 feet. That level was agreed upon in a letter agreement in 2002. Dole has actually operated the reservoir at levels below 69 feet. The Engineering Division is now proposing to reduce the starting reservoir level to allow the reservoir to store a 100 year storm event, similar to the December 11, 2008 event. This lower operational level would only be able to mitigate against a single large storm event and not back to back events as the draw down capability is not large enough. The Engineering Division would like additional outlet gates on the tower restored as soon as possible. Rebuilding other gates will provide an ability to draw down the reservoir much faster. Moreover rebuilding at least two of the gates will provide backup ability to draw down in case any gate fails.

The Department of Health indicated that their agency did not have any special problems or authorization requirements that would arise from maintaining the reservoir at a lower level. DOH indicated with release gates at different water levels, there could be experimentation to develop a mixing of water being released to best balance the water quality in the reservoir and in the stream.

The DLNR Division Aquatic Resources (DAR) noted that the last time fish kills had occurred the reservoir was drawn down to levels below 60 feet, and that the water did drop to 64 feet back in February 2007 with no fish kills reported. DAR previously maintained an aeration system to provide additional oxygen in the water, but is no longer operating that system. DAR will investigate putting the aeration system back in use. According to DAR records, the other gates on the tower are at 68', 53', 29' and 15'.

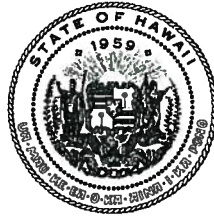
Dole Foods (Dole) were did not have any opposition to the water lowering proposal. DLNR requested that Dole provide DLNR with a final inspection report or certification of the tunnel repairs and the safe carrying capacity of the outlet tunnel. Dole indicated that they had drawings of the outlet tower gate set up. Dole was concerned that a great part of the cost of restoring the gates could be reduced if the reservoir level could be lowered below the lowest gate to be repaired so that the work did not have to be done under water, and the repairs could be achieved much faster if they were less expensive. Others present indicated that they are willing to work with Dole in their efforts to repair the gates, and were willing to allow Dole the ability to lower the water (low 60') and investigate if this work could be accomplished above water for the upper gate.

Sustainable Hawaii, Howard Green indicated that he agrees that the spillway needs to pass the 250 year storm event as identified in the Hawaii Revised Statute Chap. 179D.

Conclusions:

It was agreed by all parties that Dole Foods would drop the operational level of the reservoir to be between 60 and 65 feet. Dole would also drop the water level down lower to try to expose the upper gate and obtain a quote from a contractor to see how much it would cost to replace the gate and make it operational again or to just remove the existing gate and leave the opening. Dole will follow-up with DLNR on future mitigation efforts.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

ENGINEERING DIVISION
POST OFFICE BOX 373
HONOLULU, HAWAII 96809
MAR - 5 2014

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ESTHER KIA'AINA
FIRST DEPUTY DIRECTOR

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
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CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Mr. Dan Nellis
Operations Director
Dole Food Company Hawaii
1116 Whitmore Avenue
Wahiawa HI, 96786

Howard Green
Manager
Sustainable Hawaii, Inc.
PO Box 3467
Honolulu, HI 96801

Dear Mr. Nellis and Mr. Green:

**NOTICE OF DEFICIENCY
EMERGENCY ACTION PLAN
WAHIAWA DAM (OA-0017)**

The Department of Land and Natural Resources, Engineering Division (Department) hereby notifies the owner of the subject regulated dam that the Department does not have an updated Emergency Action Plan (EAP) on file for this facility. Section 179D-30, Hawaii Revised Statutes, requires that the owners of State regulated high and significant hazard potential dams and reservoirs establish an EAP and provide this EAP to the Department and other necessary parties.

Please submit a completed EAP for the subject dam to DLNR by May 1, 2014. You may obtain information on how to establish an EAP on the DLNR Engineering Division website (<https://dlnreng.hawaii.gov/dam/forms/emergency-action-plan>).

Failure to submit a complete EAP would be in violation of Hawaii Administrative Rules §13-190.1-42, and subject to an administrative penalty up to \$500 for the first violation and up to \$1,000 for repeat violations.

If you need to further discuss this subject, please contact Mr. Jimmy Leung at 587-0238

Sincerely,

A blue ink signature of Cary S. Chang, written in a cursive style.

CARTY S. CHANG
Chief Engineer

DAVID Y. IGE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

ENGINEERING DIVISION
POST OFFICE BOX 373
HONOLULU, HAWAII 96809

OCT 26 2016

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Mr. Dan Nellis
Operations Director
Dole Food Company Hawaii
1116 Whitmore Avenue
Wahiawa, Hawaii 96786

Mr. Howard Green
Manager
Sustainable Hawaii, Inc.
P. O. Box 3467
Honolulu, Hawaii 96801

Dear Mr. Nellis and Mr. Green:

**WAHIAWA RESERVOIR (OA-0017), OAHU
NOTICE OF DAM SAFETY DEFICIENCY**

This letter is to notify you that the subject regulated dam/reservoir was determined to be in poor condition and a threat to public safety due to one or more physical/operational conditions and deficiencies that were noted in previous inspection reports. The condition determination for this facility was established from the Department of Land and Natural Resources (Department) statewide investigations from 2007 to 2009 and subsequent dam safety inspections.

This structure was previously issued a notice of deficiency and this notice supersedes the conditions stipulated in that previous notice.

Your immediate action is required of the following:

1. Maintain a lower water level in the reservoir:
 - a. At a minimum, lower and maintain the operating water level in the reservoir to 15 feet below spillway (65 FT. ON GAGE) within ten (10) days of this notice.
 - b. Continue to take actions to maintain the water level at/or below this maximum operational level.
 - c. Provide photographic documentation of the lowered water level at the staff gage within fifteen (15) days of this notice.
 - d. Failure to maintain the water level below this restricted level would be subject to civil resource violation penalties in the amount of \$1,000 for the first violation.

- e. Submit a Remediation Schedule to the Department detailing when deficient conditions will be corrected, within twenty (20) days of this notice. (A sample format is attached.)
 - f. Continue operation of a real time water level monitoring gage system to monitor the water level in the reservoir and provide DLNR access to real time data readings.
 - g. Update the Emergency Action Plan. If your EAP has not been updated in the last 12 months, update and distribute updated copies within thirty (30) days of this notice. An online tool is available to update the EAP. Please contact the Department if you need assistance.
2. Submit monthly monitoring reports:
- a. Take daily/weekly readings of applicable water level, seepage rates, etc., and relevant photos. Submit the monitoring reports to the Department assigned engineer's email: jimmy.m.leung@hawaii.gov, at the beginning of each month for the previous month.
 - b. A sample log sheet is attached. The log sheet shall be tailored to the site-specific needs for the facility. Please contact the Department for a soft copy to customize.
 - c. The initial report is due the first month following receipt of this notice.

Continued operation and maintenance of the facility is still required and all previously noted deficiencies still need to be addressed. Failure or delinquency to comply with the above stated actions may result in additional penalties and/or Board of Land and Natural Resources actions. Please contact Mr. Jimmy Leung of my staff at (808) 587-0238 should you have any questions regarding this matter.

Sincerely,


CARTY S. CHANG
Chief Engineer

Attachments

_____ Reservoir Daily Log
Month/Year: _____

Date	Rainfall	Reservoir Water Level Height (gage)	Intake flow rate:	Outlet flow rate:	Maintenance	Seepage flow rate:	Remarks Top of Dam gage reading = ____ Spillway gage reading = ____
1							
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Totals							

List of Recommendations / Actions is based on Dam Safety Regulatory Requirements, the most recent Phase I Investigations, and Dam Safety Inspections. This list may not be a comprehensive or current list and is subject to revisions and updates based on discussions with DLNR staff.

Regulatory Requirements				Status of Requirements			Dam Remediation Plan		
	Description of Requirement		Source of Requirement	Owners Response	Owners Proposed Schedule	DLNR Comment			Dam Remediation Plan (Item No.)
	Embankment slopes not steeper than 2.5H:1V		HAR 13-190.1-4						
	Minimum crest width 10-ft		HAR 13-190.1-4						
	Earthen spillway in natural ground		HAR 13-190.1-4						
	Low level outlet for draining reservoir		HAR 13-190.1-4						
	Stability analysis (High/Significant)		HAR 13-190.1-4						
	Spillway pass appropriate Inflow Design Flood (H&H)		HAR 13-190.1-4						
	Meet Freeboard requirements (H&H)		HAR 13-190.1-4						
	Operations & Maintenance Plan		HAR 13-190.1-40.1						
	Checklists, logbook, inspection forms		HAR 13-190.1-40.1						
	Emergency Action Plan		HAR 13-190.1-42						H1
	Access to Dam Features		HRS 179D-30						A1
	Maintain records (improvements, O&M, etc)		HRS 179D-30						D4
	Good Standing		HRS 179D-30 HAR 13-190.1-50 to 52						Not on Sheet

Outstanding Deficiencies					Status of Deficiencies			CAI conditions and status		
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Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
1	1	Modify the Spillway and Dam to Safely Pass the PMF or Breach the Dam. The existing spillway capacity is less than 50 percent of the PMF. This is a serious dam safety deficiency. Failure to address this deficiency can result in overtopping and failure of the embankment. Since Wahiawa Dam is a high hazard dam, failure of the dam is likely to cause loss of life and significant property damage. If the dam is modified to pass the PMF, the Hydrologic and Hydraulic analyses should be updated. A physical model study is recommended to evaluate and confirm the hydraulic performance of the spillway given its irregular configuration. A structural stability analysis of the thin plate-like concrete armoring in the spillway should also be performed given the considerable hydrodynamic forces that are exerted on this structure during extreme floods. Hydraulic loadings determined from the physical model study should be used in the structural stability analysis of the spillway. A combination of modifying the spillway, raising the embankment, and armoring the embankment with roller-compacted concrete (RCC) to provide overtopping protection may be an effective solution.	1-Aug-2008	Gannett Fleming Phase I	Evaluate the need and the cost to modify the spillway and dam to pass the PMF	By 12/13/13				

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
2	1	"Evaluate the Need to Provide Additional Drawdown Capacity. Only one 20-inch gated intake is operational. The 20-inch gate was installed between two of the three existing inoperable 36-inch by 48-inch gated intakes. Evaluate the adequacy of the existing 20-inch gated intake to maintain the lowered pool and to provide reliable reservoir drawdown capacity in the event of an emergency."	1-Aug-2008	Gannett Fleming Phase I	All gates and valves are now operational and we now have maximum drawdown capacity	Done	8/5/15 Completed			
3	1	Perform Additional Embankment Stability Investigations. Based on a review of the construction history and stability analyses performed on the dam, concerns remain. The absence of an embankment filter zone between the hydraulic fill and the rock fill can result in the migration of the hydraulic fill into the rock fill as the timber core wall deteriorates. Further evaluation of this failure mode is recommended. In addition, the slope failure factors of safety for the seismic loading are marginal and a review of the assumed seismic loading and the stability analyses is warranted.	1-Aug-2008	Gannett Fleming Phase I	We will consult geotech engineering firm to evaluate the need to perform additional embankment stability analysis.	8/31/2013	8/5/15 Not done			
4	1	Develop New Dam Instrumentation Plan and Program. Current instrumentation at the dam includes several piezometers, a reservoir staff gage, and several seepage weirs. All of these instruments are in a deteriorated state and are not being maintained, monitored, or analyzed. The condition of the piezometers should be assessed to determine which piezometers, if any, are functional. Unnecessary and inoperable piezometers should be abandoned as directed by an engineer. The seepage weirs and staff gages need to be replaced. The need for additional instruments, including surface monuments, should be evaluated, and new instruments installed as recommended. A formal program of regularly reading and recording the information from all instruments and evaluating the performance of the dam should be implemented. The instrumentation monitoring program should include submission of an annual report summarizing the instrument readings and overall performance of the dam to the DLNR.	1-Aug-2008	Gannett Fleming Phase I	Evaluate the need and the cost to develop new instrumentation plan and program.	8/31/2013	8/5/15 Not done			

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
5	2	Remove Unwanted Vegetation and Maintain Grass Cover. The vegetation on the embankment and along the spillway walls must be controlled and maintained. Tall grass on the embankment and trees and woody vegetation on the groins and along the toe of the dam needs to be removed. Irregularities in the downstream slope should be regraded and seeded. It is important that the dam embankment be maintained in a condition that can be readily inspected for changed conditions, especially during flood events when the reservoir fills. The current condition of the dam does not permit adequate inspection and the tall grass significantly obscures early detection of a changed condition such as a slope failure or seepage. All trees and other woody vegetation should be cleared and grubbed at least 20 feet beyond the toe of the dam, abutments and groins. This will require adopting an operation and maintenance program that will preclude the need for future removal of unwanted vegetation.	1-Aug-2008	Gannett Fleming Phase I	Maintenance of embankment is on-going.	On-going				
6	2	Remove Remnants of Inflatable Dam from Spillway. The remnants of the abandoned inflatable dam on the control section of the spillway crest decrease the spillway capacity by increasing friction losses and obstruct inspection of the concrete slab. The inflatable dam remnants and deteriorated appurtenances associated with the inflatable dam including the corroded piping in the spillway should be removed. Consider backfilling the abandoned ramped concrete enclosure at the left spillway abutment to improve public safety and eliminate future maintenance and potential stability problems with this structure.	1-Aug-2008	Gannett Fleming Phase I	Remnants of inflatable dam have been removed.	Done	8/5/15 Completed			
7	2	Repair Deteriorated Concrete Spillway Structures. Deteriorated spillway structures include the undermined upstream end of the left spillway training wall, deteriorated surfaces of the spillway crest structure and apron, and spalled areas on the spillway wall. These areas should be backfilled, patched, and resurfaced. A more detailed investigation of the sections of deteriorated apron slabs should be performed, including coring and testing the concrete, to determine the extent of the deterioration. Concrete cracks and joints should be sealed with flexible sealant.	1-Aug-2008	Gannett Fleming Phase I	Investigate the area and cost to repair deteriorated concrete spillway	12/31/2013	8/5/15 Not done			

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
8	2	Install Fence Along Top of Left Spillway Wall. Wahiawa Dam is located in a densely populated residential area and the reservoir is open to public fishing. Although the existing chain-link fence at the left dam abutment restricts access to the site, the spillway structure has tall training walls and significant drops without effective fall protection. Consider installing a fence along the top of the left spillway training wall and other areas of concern to improve public safety.	1-Aug-2008	Gannett Fleming Phase I	Chain link fence has been installed on the left spill wall.	Done	8/5/15 Completed			
9	2	Update EAP and Perform Tabletop Training Exercise. The existing emergency action plan needs to be updated in accordance with the findings of the 2008 USACE Dam Break Study. Consider performing a tabletop training exercise with the owner and emergency response personnel to exercise the Emergency Action Plan (EAP). The objective of the EAP Periodic Test is to familiarize key stakeholders with the EAP, provide a training opportunity for those stakeholders, and help identify areas where the EAP could be improved. The EAP Periodic Test should begin with a brief orientation session that includes an overview of the DLNR dam safety program, a brief dam safety overview presentation by the facilitator, and a familiarization site tour of the dam site and key downstream areas of concern.	1-Aug-2008	Gannett Fleming Phase I	EAP updates will be completed using the DLNR template as a guide.	9/31/13	8/5/15 done			
10	2	Submit O & M Plan	1-Mar-2013	HAR Requirement	Submitted	7/28/2015	8/5/15 Completed			
11	2	Start & maintain log book	1-Mar-2013	2015 Inspection			8/5/15 Not submitted			
12	2	Initiate lowering of the water level to 60-feet on gage to allow the investigation of the condition of the highest gate in the outlet structure. Complete this investigation and report the findings by June 30, 2009. Please notify us immediately if delays are encountered due to inclement weather and/or other conditions. We also recommend you take advantage of the lowered water level to hire divers to evaluate the other gates in the structure at the same time.	4-Jun-2009	Notice of Deficiencies	We started lowering the water level at the Wahiawa Reservoir on June 18, 2009 to investigate the condition of the highest gate. We plan to lower the water level to approximately sixty feet. We met with Pat Ross of Sea Engineering on July 9, 2009 and they will provide us with a quote to repair or replace the valves at the gate house. After we hire a contractor we will have a work plan and schedule in place for this project.	3/13/2009	8/15/15 On-going			
13	1	Maintain a normal daily water level of 65-feet on gage after the completion of the upper gate investigation.	4-Jun-2009	Notice of Deficiencies	Following investigation of the upper gate, we will maintain the water level at about sixty five feet, as agreed.	3/13/2009	8/5/15 On-going			

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
14	1	Initiate monitoring of the water level and dam condition and report WEEKLY in writing or via email to involved parties (i.e. DLNR-ENG, DLNR-DAR, DLNR Parks, DOH-CWB, Sustainable Hawaii, etc.) until after the completion of the upper gate investigation, and a daily water level of 65-feet on gage level is maintained.	4-Jun-2009	Notice of Deficiencies	Our data logger at the Dam can record down to about 60 feet. We can call in at anytime to monitor the water level of the reservoir. The water level is currently maintained at below 65 feet and Sea Engineering will give us a report on the upper gate. Weekly reports will be submitted by e-mail to DLNR to verify reservoir water levels .	3/13/2009	8/5/15 on-going			
15	1	Prior to lowering the water level to investigate the gate, please contact Francis Oishi, DLNR-DAR at 587-0094 to arrange monitoring of the aquatic resources and Curt Cottrell, DLNR-Parks at 587-0062 to arrange for possible closure of the boat ramp in the fresh water park	4-Jun-2009	Notice of Deficiencies	We have informed DLNR DAR and DLNR Parks of our plans to lower the water level so that they can monitor the fish in the reservoir and the boat ramp at the Freshwater Park.	3/13/2009	8/5/15 Done			
16	1	Evaluating and providing a work plan and schedule for addressing the inadequate spillway capacity.	4-Jun-2009	Notice of Deficiencies	We are evaluating different means and any need to address the spillway capacity. In the meantime, to provide enough capacity to store water from a 100 year storm similar to the one on December 11, 2008, we plan to keep the water level down to about 60-65 feet and repair gates which can be opened to draw down the reservoir in anticipation of a rain storm event. Also, the Army's Ku Tree Reservoir, on the south fork of Kaukonahua Stream, can impound about 900 acre feet of water. This should also help lessen the flow of water into Wahiawa Reservoir.	7/31/2009	8/5/15 Not done			

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
17	1	Providing a conceptual work plan and schedule for repairing or replacing the gates within the outlet structure.	4-Jun-2009	Notice of Deficiencies	We started lowering the water level at the Wahiawa Reservoir on June 18, 2009 to investigate the condition of the highest gate. We plan to lower the water level to approximately sixty feet. We met with Pat Ross of Sea Engineering on July 9, 2009 and they will provide us with a quote to repair or replace the valves at the gate house. After we hire a contractor we will have a work plan and schedule in place for this project.	7/31/2009	8/5/15 Done			
18	1	Evaluating and addressing the stability of the embankment.	4-Jun-2009	Notice of Deficiencies	We will need to retain an engineer to discuss the stability of the embankment. Hirata and Associates will most likely be consulted as they are very familiar with the Wahiawa Dam.	7/31/2009	8/5/15 No Report			
19	1	Removal of unwanted vegetation.	4-Jun-2009	Notice of Deficiencies	Maintaining the grass cover of the downstream slope is ongoing. We will identify trees and woody vegetation on the groins and along the toe of the dam and determine if they will need to be removed. We will use the FEMA 534- Technical Manual for Dam Owners - Impact of Plants on Earthen Dams as a guide.	7/31/2009	8/5/15 On going.			
20	2	Submittal of the Final Outlet Tunnel Repair Report and the new safe/rated carrying capacity of the tunnel.	4-Jun-2009	Notice of Deficiencies	The contractor for the outlet tunnel project will do an inspection of the outlet tunnel sometime in July and should be able to do a final report and calculate a safe/rated carrying capacity of the outlet tunnel. We will let you know as soon as we can confirm a date for this inspection.	7/31/2009	8/5/15 Not done. DLNR did not receive report			

Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
21	1	Addressing all other deficiencies noted in the Gannett Fleming Phase I Dam Safety Inspection Report (August 2008).	4-Jun-2009	Notice of Deficiencies	As your office requested, we returned all copies of the Gannett Fleming Phase I Safety Inspection Report (August 2008) to your office for revision. We will address all deficiencies noted in the report when the revised version is returned to us.	7/31/2009	8/5/15 Incomplete			

CAI Minimum Operational Requirements					Status			CAI conditions and status		
Deficiency #	Priority #	Description of Deficiency	Date of Documented Deficiency	Source of Documented Deficiency	Owners Response	Owners Proposed Schedule	DLNR Comment	DLNR Response (Matrix)	Restrictions / Special Conditions	Dam Remediation Plan (Item No.)
1		Spillway (Approach and Channel) Clear	26-May-2016	DLNR Inspection		Done	Yes, Clear on date of inspection			
2		Ability to maintain reservoir empty (inlet diversion / outlet)	26-May-2016			No	No control, in-stream drainage area			
3		O&M Manual on file	26-May-2016	DLNR Inspection		Done	Yes, Submitted on 7/28/15			
4		Access to Dam & Appurtenant Features	26-May-2016	DLNR Inspection		Done	Yes			
5		Proof of regular facility inspections	26-May-2016	DLNR Inspection		No	No, Inspection logs not provided			
6		EAP on file (High & Significant)	26-May-2016	DLNR Inspection		Yes	Done			
7		Updated EAP on file (High & Significant)	26-May-2016	DLNR Inspection		No	Submit update			
8		Owner in Good Standing - Fees / ltrs of deficiencies	26-May-2016							

DAVID Y. IGE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Feb 18, 2020

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

Certified Mail

Mr. Daniel X. Nellis
General Manager
Dole Food Company Hawaii
1116 Whitmore Avenue
Wahiawa, Hawaii 96786

Mr. Howard Green
Manager
Sustainable Hawaii, Inc.
PO Box 3467
Honolulu, Hawaii 96801

Dear Mr. Nellis and Mr. Green:

**WAHIAWA DAM (OA-0017), OAHU
DAM SAFETY - NOTICE OF DEFICIENCY**

The subject regulated dam/reservoir has been classified to be in a poor overall condition and a threat to public safety due to one or more physical / operational conditions and deficiencies identified by the Department of Land and Natural Resources (Department). This Notice of Dam Safety Deficiency supersedes the conditions stipulated in previously issued notice of deficiencies.

The subject facility is classified as a High Hazard Potential dam, as failure could jeopardize the lives of the downstream public. The dam's spillway is not be able to pass the Probable Maximum Flood (PMF) as required by Hawaii Administrative Rules (HAR) Chapter 13-190.1. We understand that your company has engaged the services of an engineer to assist in the evaluation and design of these improvements.

Pursuant to Hawaii Revised Statutes (HRS) 179D-6, you are required to take the following remediation, and maintenance and monitoring actions, by the deadlines indicated:

1. **Remediation Schedule:**

By 3/1/2020:

- a. **Submit Technical Studies:** Submit reports completed by your engineer to document compliance with HAR §13-190.1-4. Submit topography map, Hydrologic/Hydraulic studies, stability analysis and/or other applicable reports required to support the proposed improvements.

By 3/1/2021:

- b. **Submit Dam Safety Permit Application:** Submit a complete dam safety permit application package (HAR §13-190.1-20) to bring your facility into compliance with HAR §13-190.1-4

By 3/1/2022:

- c. **Start Construction:** Start Construction of the approved Dam Safety Permit improvements.

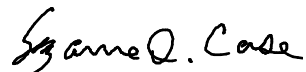
2. **Owner Maintenance and Monitoring:**

- d. Keep and maintain the reservoir level at or below 65 feet (gage) under normal conditions.
- e. Submit monthly monitoring reports including reservoir water level, photos of the water level at the staff gage and other pertinent information to the Department's Dam Safety Program via email. Monthly reports shall be due by the first week of the next month. The initial report is due the first month following receipt of this notice.

Email reports to: dlr.en.fcds@hawaii.gov

Failure to comply with the Remediation and Maintenance and Monitoring actions by the indicated deadlines may result in penalties and other actions by the Board of Land and Natural Resources pursuant to HRS §§ 179D-6 and 8 and HAR § 13-190.1-5. Please contact Edwin Matsuda of my Engineering Division staff at (808) 587-0268 should you have any questions regarding this matter.

Sincerely,



SUZANNE CASE
Chairperson

ATTACHMENT B

Owner Response Correspondence from July 16, 2009, April 30, 2019,
and December 30, 2020

**Wahiawa Water Company
1116 Whitmore Avenue
Wahiawa, HI, 96786**

July 16, 2009

Certified Mail
Return Receipt Requested

Mr. Eric Hirano, Chief Engineer
Department of Land and Natural Resources
Engineering Division
1151 Punchbowl Street, Rm 221
Honolulu, HI 96813

Re: Notice of Dam Safety Deficiency – Wahiawa Dam

Dear Mr. Hirano:

I write on behalf of Wahiawa Water Company, the operator and partial owner of Wahiawa Dam, in response to your letter dated June 4, 2009 regarding the above. The paragraphs below address each of the action items listed on pages 2 and 3 of your letter.

1. We started lowering the water level at the Wahiawa Reservoir on June 18, 2009 to investigate the condition of the highest gate. We plan to lower the water level to approximately sixty feet. We met with Pat Ross of Sea Engineering on July 9, 2009 and they will provide us with a quote to repair or replace the valves at the gate house. After we hire a contractor we will have a work plan and schedule in place for this project.
2. Following investigation of the upper gate, we will maintain the water level at about sixty five feet, as agreed.
3. Our data logger at the Dam can record down to about 60 feet. We can call in at anytime to monitor the water level of the reservoir. The water level is currently maintained at below 65 feet and Sea Engineering will give us a report on the upper gate. Weekly reports will be submitted by e-mail to DLNR to verify reservoir water levels..
4. We have informed DLNR DAR and DLNR Parks of our plans to lower the water level so that they can monitor the fish in the reservoir and the boat ramp at the Freshwater Park.
5. We are evaluating different means and any need to address the spillway capacity. In the meantime, to provide enough capacity to store water from a 100 year storm similar to

the one on December 11, 2008, we plan to keep the water level down to about 60-65 feet and repair gates which can be opened to draw down the reservoir in anticipation of a rain storm event. Also, the Army's Ku Tree Reservoir, on the south fork of Kaukonahua Stream, can impound about 900 acre feet of water. This should also help lessen the flow of water into Wahiawa Reservoir.

6. See #1 above.

7. We will need to retain an engineer to discuss the stability of the embankment. Hirata and Associates will most likely be consulted as they are very familiar with the Wahiawa Dam.

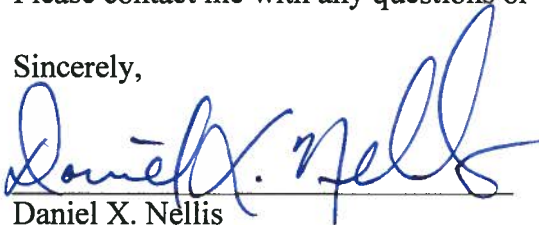
8. Maintaining the grass cover of the downstream slope is ongoing. We will identify trees and woody vegetation on the groins and along the toe of the dam and determine if they will need to be removed. We will use the FEMA 534 – Technical Manual for Dam Owners – Impact of Plants on Earthen Dams as a guide.

9. The contractor for the outlet tunnel project will do an inspection of the outlet tunnel sometime in July and should be able to do a final report and calculate a safe/rated carrying capacity of the outlet tunnel. We will let you know as soon as we can confirm a date for this inspection.

10. As your office requested, we returned all copies of the Gannett Fleming Phase I Safety Inspection Report (August 2008) to your office for revision. We will address all deficiencies noted in the report when the revised version is returned to us.

Please contact me with any questions or comments.

Sincerely,

A handwritten signature in blue ink, appearing to read "Daniel X. Nellis", is written over a horizontal line.

Daniel X. Nellis
Operations Director

cc: Howard Green, Sustainable Hawaii



Food Company Hawaii

1116 Whitmore Avenue Wahiawa, Hawaii 96786

Daniel Nellis
Dole Food Company Hawaii
1116 Whitmore Ave.
Wahiawa, HI, 96786

April 30, 2019
Mr. Carty Chang
State of Hawaii
Department of Land and Natural Resources
Engineering Division
PO Box 373
Honolulu, HI, 96809

Dear Mr. Chang,

We wanted to update you on our progress and next steps regarding Wahiawa Reservoir (OA-0017) and the Notice of Dam Safety Deficiency (NOD) we received in 2016. Since 2016, Dole has completed significant work in addressing the outstanding deficiencies identified as high priority. Although there is still a lot of work to be done, we want to ensure you we are committed to bringing the dam up to compliance.

Since the 2016 NOD we have completed three major milestones addressing the spillway and embankment stability.

- November 2017: Phase 1 Spillway Improvement Study was completed by our civil engineer R.M. Towill. The report assessed the current condition of the existing spillway and developed a HEC-HMS hydrologic model to obtain an inflow hydrograph for the PMF. The report also identified potential design concepts for an improved spillway with discharge rating curves for each of the concepts. Two of the potential designs are capable of passing the PMF.
- May 2018: Slope Stability Analysis was completed earlier this year by our geotechnical engineer Hirata & Associates. The study drilled two exploratory borings to depths of 88ft and concluded the embankment is in satisfactory condition and is capable of impounding an additional 3 feet of water with the Aqua Dam.
- November 2018: Completed Engineers' estimates of construction costs of modifying spillway to safely pass a PMF storm (2 different designs) and construction costs to breach the dam.

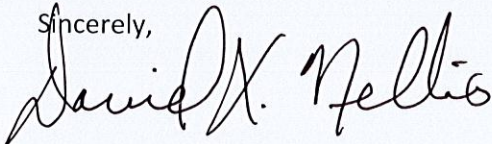
In addition, we have a thorough Emergency Contingency Plan to prevent overtopping of the dam, especially in the event of back-to-back major storm events. The plan includes maintaining low water levels at all times and utilizing the DLNR Aqua Dam in the event of a possible dam overtopping. The Aqua Dam is currently stored on site and can be deployed very quickly by our on-call contractors in an emergency event.

Next Steps

- Based on the construction cost estimates we have determined the PMF spillway is economically unfeasible for Dole Food Company Hawaii. The estimated costs to modify the spillway to meet PMF were well over \$10M, which would more than likely put Dole Food Company Hawaii out of business. Therefore, we have engaged our corporate entity for assistance in financing this project. We have tentative plans to tour the Wahiawa Dam with the President and CEO of Dole Food Company in May, 2019 and bring him up to speed with our progress and future work needed.
- Concurrently, we are pursuing both Federal and State government funding opportunities for help in financing the project. We have scheduled tours to the Wahiawa Dam in May 2019, with staff from both U.S Representatives Case and Gabbard's offices. On the state level, we will be meeting with the Department of Agriculture as well as our local State Senator to identify any potential help on the State Level.
- We are also looking at putting the Wahiawa Dam up for sale. As of now this would be a back-up plan if we cannot obtain the financing for the construction. We have some potential parties interested in the dam and irrigation system and have already begun initial discussions.

Thank you for this opportunity to update you on how we are addressing the deficiencies of the Wahiawa Reservoir. Again, we are committed to Dam Safety and bringing this reservoir up to level where all parties are confident in its ability to safely function. If you have any questions or comments please call Kyle Barber at 808-561-3650.

Sincerely,

A handwritten signature in black ink, reading "Daniel X. Nellis". The signature is fluid and cursive, with the first name "Daniel" and last name "Nellis" clearly legible.

Daniel X. Nellis
General Manager



*21 JAN-8 PM12:10 ENGINEERING

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TK

DEPT. OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

December 30, 2020

Dan Nellis
Dole Food Company Hawaii
1116 Whitmore Ave,
Wahiawa, HI 96786

Certified Mail

Suzanne Case
State of Hawaii
Department of Land and Natural Resources
PO Box 621
Honolulu, HI 96809

Subject: Wahiawa Reservoir (OA-0017) and the Notice of Dam Safety Deficiency (NOD)

Dear Ms. Case,

We are writing to provide an update regarding Wahiawa Reservoir (OA-0017) and in response to the NOD received on February 18, 2020. Since 2016, Dole Food Company Hawaii (Dole Hawaii) has worked to address outstanding deficiencies identified as high priority. We are committed to operating Wahiawa Dam safely and in compliance with State regulations.

Since 2017, considerable work regarding the spillway and dam embankment has been completed. This includes:

1. November 2017: A Phase 1 Spillway Improvement Study was completed by contracted civil engineer R.M. Towill. The report assessed the current condition of the existing spillway and developed a HEC-HMS hydrologic model to obtain an inflow hydrograph for the PMF. The report also identified potential design concepts for an improved spillway with discharge rating curves for each of the concepts. Two of the potential designs are capable of passing the PMF.
2. May 2018: A Slope Stability Analysis was completed in early 2018 by geotechnical engineer Hirata & Associates. For this study, two exploratory borings were drilled to depths of 88ft. It was concluded that the embankment is in satisfactory condition and capable of impounding an additional 3 feet of water with the Aqua Dam.
3. November 2018: An Engineers' estimates of construction costs were completed for modifying spillway to safely pass a PMF storm (2 different designs), as well as construction costs to breach the dam.

In addition to the milestones above:

- An Emergency Contingency Plan was prepared in 2017 with the objective to prevent overtopping of the Wahiawa Dam.
- Two water level monitoring systems (USGS and Dole private) are active on site as a double safety measure.
- Piezometers continue to be read bi-monthly by an environmental and engineering consultant with reports generated semi-annually.
- Sept 2019: The Aqua Dam and sandbags were moved to an on-site container in close proximity to the edge of the dam crest. This allows for more efficient access to materials during an emergency situation.
- The Emergency Action Plan (EAP) was updated for 2020.

Dole has been pursuing opportunities for assistance with addressing the NOD and bringing the spillway to compliance for passing a PMF storm event:

Dole Hawaii, a subsidiary of Dole Food Company Inc., is evaluating the cost to make the spillway modification. The high cost of the spillway modification balanced against Dole Hawaii's profit margin is concerning. The 2020 Covid-19 economy has created an even more difficult path forward in pursuing funds as Dole Hawaii is operating at a significant loss for 2020, and likely well into 2021.

As an intermediate step, AECOM was contracted by Dole in September 2020 to perform an Incremental Hazard Assessment (IHA) for Wahiawa Dam to potentially support a variance that could reduce the size of a new spillway. A reduction of the spillway could considerably bring down construction costs making the project more economic. Report findings are estimated to be completed in early 2021 and will be shared with the DLNR team upon completion.

The Wahiawa Irrigation System and the Wahiawa Dam are for sale. Interest from two different parties was moving forward at the beginning of 2020, however the Covid-19 pandemic has slowed progress toward closing. Dole has been clear in communicating to both interested parties that the spillway is deficient and will have to be upgraded to bring the dam to compliance. Construction cost estimates and other work toward dam compliance has been shared with both interested parties. At this point, selling the system is still viable once negotiations are able to resume past delays caused by Covid-19. We anticipate significant progress can be made in 2021.

We do not expect to meet the 03/01/2021 timeline to submit a dam safety permit application for the construction. Work with AECOM using the IHA is imperative for any

potential options in reducing the size of the spillway based on the incremental assessment. Secondly, if we can reach an agreement with a buyer, they will want the option of designing the spillway that fits their intended purpose which may include hydro-power. At this time, we request a 12-month extension on the deadlines proposed in the February 18, 2020 letter. If we are forced to take immediate action on the spillway, we fear this could cause irreversible damage to Dole Hawaii's operation and the approximately 250 people we employ.

Thank you for this opportunity to provide an update regarding Wahiawa Reservoir. We remain committed to Dam Safety and to keeping in good communication with all parties involved with the Wahiawa Reservoir's condition and challenges. If you have any questions or comments please contact Kyle Barber directly at 808-561-3650.

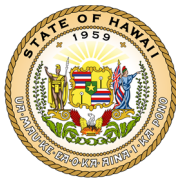
Sincerely,

A handwritten signature in black ink, appearing to read "Daniel K. Nellis", with a stylized flourish at the end.

Daniel Nellis
General Manager
Dole Food Company Hawaii

ATTACHMENT C

Meeting Notes for Meeting on December 17, 2020
Between the Owner and DLNR Staff



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
POST OFFICE BOX 373
HONOLULU, HAWAII 96809



MEETING NOTES

Wahiawa Reservoir Status Update Meeting

Date: Thursday, December 17, 2020

Time: 2:00-3:00 pm

Meeting Coordinator: Tony Koyamatsu, DLNR

Attendees: Dan Nellis, Dole Food Company
Kyle Barber, Dole Food Company
Carolyn Unser, Dole Food Company
Edwin Matsuda, DLNR
Kristen Akamine, DLNR

Conference Bridge: 808-451-0217, ID 612419

Agenda

-
- | | | |
|---|--|--|
| 1 | Status for dam relative to DLNR Notice-of-Deficiency (NOD) Letter of 2/18/20 | <ul style="list-style-type: none">• Current plan for dam• Engineering studies• Permit application timeline• Construction timeline• Monthly reports |
|---|--|--|
-
- | | |
|---|-------------|
| 2 | Other items |
|---|-------------|
-

Discussion

1. Current Plans for the Dam. Dole Food Company is actively pursuing options to sell the dam, while concurrently conducting studies to analyze modifying the dam as well as evaluating the increase risk for damage anticipated due to the deficiencies. Dole is in discussion with both a private entity and the State of Hawaii, who have expressed interest in purchasing the dam. The entities understand the new owners of the dam will be required to address the undersized spillway deficiency. COVID-19 travel restrictions have hampered site visits, which were planned earlier in 2020. Site visits will be scheduled for early-2021.
2. Engineering Studies.
 - a. In 2017, Dole contracted R.M. Towill to develop a hydrologic and hydraulic (H&H) model and a Probable Maximum Flood (PMF), which was used to develop two conceptual

designs to modify the spillway. This study was submitted to the DLNR. Subsequently, construction cost estimates were developed for both designs. Based on the anticipated costs, Dole has been investigating options to sell the facility.

- b. In 2018, Dole contracted Hirata & Associates to perform a stability analysis of the water filled Aquadam. DLNR requested another pdf copy of the report be sent. In 2020, Dole contracted AECOM to conduct incremental analyses of the impacts of a PMF storm event on the downstream community where (1) the dam is assumed to be removed and (2) the dam is breached during a PMF. The results of the study are expected in February 2021, when Dole will share the report with the DLNR and discuss the results. Preliminarily, it is anticipated that the failure of the dam would increase the flooding risk to the downstream community beyond the PMF base flooding. Depending on the results of the AECOM analysis, Dole may have AECOM perform an additional risk analysis on the likelihood of a PMF storm.
- c. From a practical standpoint, Dole prefers to use a PMF that's agreed upon by both the DLNR and Dole before developing a detailed design to remediate the dam. However, DLNR confirmed they anticipate the Probable Maximum Precipitation study update to NOAA HMR-39 will not be completed until 2022. Dole's concern is completing its design, permitting, and construction based on the PMF from the 2017 R.M. Towill study, then be required to implement changes when a subsequent future PMF is developed. DLNR confirmed that could happen, as the Administrative Rules indicate the PMF may be derived from HMR-39 or current standard.

Note: In a previous conversation with Dole, DLNR raised the concern about the discrepancy between the 2017 R.M. Towill model peak inflow PMF result and the 2008 US Army Corps of Engineers (ACOE) peak inflow PMF result. The R.M. Towill report arrived at a 32,660 cfs PMF, compared to the ACOE's 53,437 cfs PMF. The difference in PMFs will require a detailed explanation (i.e., justification) before proceeding with permitting.

- d. In 2020, the DLNR contracted Yogi Kwong Engineers (YKE) to prepare a Phase 1 Investigation Report for the Wahiawa Reservoir, which was recently finalized. DLNR will transmit a copy of the report to Dole. (Note: Dole can also view/download the report on the DLNR Dam Inventory Management System – dams.hawaii.gov).
3. Permit Application and Construction Timelines. Dole will evaluate its options to either remove the dam, or to remediate its deficiencies and keep the dam in-service, unless they're able to sell the dam. Regardless, DLNR suggested Dole provide a written response to the DLNR's NOD letter from 2/18/20 and update DLNR on the status of Dole's NOD compliance. Further, Dole should identify any milestones they will not meet and provide the anticipated completion target dates. Dole indicated they will send a letter to DLNR by 12/31/20.

4. Monthly Reports. DLNR confirmed receiving monthly reports from Dole by email. However, clarified that per the NOD letter instructions, future reports should be emailed to the DLNR Dam Safety email address (dlnr.en.fcads@hawaii.gov) as well.
5. Condition Rating. Dan Nellis expressed how the current DLNR “POOR” condition rating for the Wahiawa Reservoir may not completely reflect the past and ongoing maintenance and improvement work done on the dam. DLNR understood the frustration, however the overall physical classification rating is a nationally defined field used in the National Inventory of Dams. The Wahiawa dam does have an overall physical condition classification rating of “POOR”, based primarily on the fact that the existing spillway is insufficient to pass the Inflow Design Flood (PMF). (Note: Additional clarification of this may be found in the executive summary of the YKE Phase I Investigation for Wahiawa Dam, March 2020)

Action Items

No.	Item	Owner	Status
1.	Transmit Hirata Stability Report to DLNR	Dole	Completed 12/17/20
2.	Transmit YKE Phase 1 Investigation Report to Dole	DLNR	Completed 12/17/20
4.	Submit future monthly reports via email to dlnr.en.fcads@hawaii.gov .	Dole	
3.	Issue letter to DLNR by 12/31/20 in response to DLNR’s NOD letter from 2/18/20	Dole	

ATTACHMENT D

List of Previous Studies & Reports, Consultant Recommendations, and
Owner's Response and Plans

Inspections & Studies

The following are the previous studies and reports on Wahiawa Dam:

September 1978 Phase I Inspection Report,
Prepared by C-E Maguire, Inc. and Pacific Ocean Corps of Engineers.

September 1979 Phase II Inspection Report,
Prepared by Shannon & Wilson, Inc, and Tudor Engineering Company.

April 1994 Dam Safety Inspection,
Prepared by Earnest K. Hirata & Associates, Inc.

January 1995 Dam Safety Inspection,
Prepared by Earnest K. Hirata & Associates, Inc.

August 1996 Phase II Study,
Prepared by Earnest K. Hirata & Associates, Inc.

June 2000 DLNR Visual Dam Safety Inspection,
Prepared by State of Hawaii DLNR.

November 2003 Field Site Investigation of Wahiawa Outlet Works,
Prepared by DLNR.

May 2005 Dam Safety Inspection of Wahiawa Reservoir Dam, Prepared by
Hirata & Associates, Inc for DLNR.

May 2006 Limited Visual Dam Safety Inspections,
Prepared by the U.S. Army Corps of Engineers for DLNR.

September 2006 Investigation Report,
Prepared by Department of Health, Clean Water Branch.

November 2006 DLNR Dam Safety Inspection Post Earthquake Inspection,
Prepared by USACE for DLNR.

February 2008 Dam Break Analysis for Wahiawa Reservoir.
Prepared by USACE and Oceanit for DLNR.

August 2008 Phase I Inspection Report.
Prepared by Gannett Fleming, Inc. for DLNR

October 2009 Visual Dam Safety Inspection.
Prepared by DLNR.

November 2013 Visual Dam Safety Inspection.
Prepared by DLNR.

October 2015 Visual Dam Safety Inspection.
Prepared by DLNR.

January 22, 2016 Narrative of the Maintenance Repair Work to Wahiawa
Reservoir Gatehouse and Outlet Works, prepared by Dole Food Company
Hawaii.

April 2016 Individual Assessment Report.
Prepared by Pacific Disaster Center for DLNR.

November 2017 Hydrology and Hydraulics Study,
Prepared by R.M. Towill Corporation for Dole Foods.

April 2018 Semi-Annual Observation Hole Readings,
Prepared by Hirata & Associates.

March 2020 Phase 1 Dam Safety Investigation Report,
Prepared by Yogi Kwang Engineers, LLC for DLNR.

October 2020 Semi-Annual Observation Hole Readings,
Prepared by Hirata & Associates.

Consultant Recommendations

The following Priority 1 and Priority recommendations, from the 2020 Yogi Kwang Engineers Phase 1 Investigation, are to address documented dam safety deficiencies that could lead to an emergency situation or jeopardize the safety of the structure and downstream residents:

Priority 1 Recommendations

1. Perform an embankment stability analysis. (An unaddressed 2008 recommendation.)
2. Perform a Hydrologic and Hydraulic (H&H) analysis.
3. Conduct a structural stability analysis of the concrete armoring (i.e., walls) in the spillway.
4. Evaluate the need to provide additional drawdown capacity. (An unaddressed 2008 recommendation.)
5. Maintain a normal daily water level of 65-feet on gage.

6. Evaluate and provide a work plan and schedule for addressing the inadequate spillway capacity. (An unaddressed 2008 recommendation.)
7. Remove unwanted vegetation and maintain grass cover. (An unaddressed 2008 recommendation.)

Priority 2 Recommendations

1. Develop a New Dam Instrumentation Plan and Program. (An unaddressed 2008 recommendation.)
2. Remove remnants of inflatable Fabridam from Spillway.
3. Repair deteriorated concrete spillway structures. (An unaddressed 2008 recommendation.)
4. Install fence along top of left spillway wall to improve public safety.
5. Update EAP in accordance with the findings of the 2008 USACE Dam Break Study and perform tabletop training exercise.
6. Submit Operation and Maintenance (O&M) Plan.
7. Start and maintain log book.
8. Submit the Final Outlet Tunnel Repair Report and the new safe/rated carrying capacity of the tunnel.
9. (An unaddressed 2008 recommendation.)

Owner's Response and Plans

The Owner has provided responses and conducted studies from 2009 to 2020, but the reservoir's spillway deficiencies and risks from 2009 continue to exist. See Attachment B for the Owner's correspondence responding to the NODs.

In correspondence dating back to April 2019 and again in December 2020, the Owner stated plans to sell the Wahiawa Dam, and in parallel pursuing Federal and State government funding opportunities to remediate the dam's deficiencies. In a meeting with DLNR staff on December 17, 2020, the Owner reconfirmed they continue to actively pursue selling the dam, as well as evaluating options to remove or modify the dam. Securing funding to remove or modify the dam continues to be a challenge for the Owner. See the meeting notes in Attachment C.

In 2020, the Owner contracted AECOM to conduct an incremental analysis of the impacts of a PMF storm event on the downstream community where (1) the dam is assumed to be removed and (2) the dam is breached during a PMF. The results of the

study are expected in February 2021, when Dole will share the report with the DLNR and discuss the results. Preliminarily, the Owner anticipates a dam failure would increase the flooding risk to the downstream community beyond the PMF base flooding. Depending on the results of the AECOM analysis, the Owner may have AECOM perform an additional risk analysis on the likelihood of a PMF storm.

In previous conversations with the Owner, DLNR staff raised the concern about the discrepancy between the 2017 R.M. Towill model peak inflow PMF result and the 2008 US Army Corps of Engineers (ACOE) peak inflow PMF result. The R.M. Towill report arrived at a 32,660 cfs PMF, compared to the ACOE's 53,437 cfs PMF. The difference in PMFs will require a detailed explanation (i.e., justification) before proceeding with design and permitting.

ATTACHMENT E

Summary Sheet of the Wahiawa Dam and Scorecard

Wahiawa Dam OA-0017

- Recommended fine: \$20,000
- Dam status: In-service, limited to 65-ft (20-ft below spillway) because of undersized spillway
- Owner's plan: Sell dam, remediate, or remove
 - Actively pursuing sale of dam
 - Completed conceptual designs in 2017 and cost estimate in 2018
 - Consultant currently performing incremental hazard assessment
 - Dole requested one-year extensions on 3/1/21 permit submittal and 3/1/22 construction start deadlines
- Level gage has been providing real-time data and Dole issues monthly monitoring reports



SCORECARD												
Owner	Dam ID	Dam Name	Dam Status	Owner's Plan	Level Gage	Monthly Reports	Consultant Retained	Studies	Permit Application	Construction Start	Action Recommended	
Typical cost of remediation -->					\$12-15K	No Cost	\$50-100K	\$50-200K	\$10-30K	>\$500K		
Dole Food Co.	OA-0017	Wahiawa	In-service, kept below 65-ft	Sell dam, remediate, or reduce cap; but no funds	Done	Done	Done	Done	3/1/21	3/1/22	\$20,000 fine	
									12-mo extension requested	12-mo extension requested		
			Recommended fine amount -->						\$20,000			
					GREEN rating:	Done or completed		RED rating:	"No," or missed deadline and no plan (TBD)			



Wahiawa (OA-0017) Scorecard & Penalty Breakdown